

BATTERY RELIABILITY TEST SYSTEM MODEL 17010H

The Chroma 17010H Battery Reliability Test System is high-precision charge and discharge test equipment specifically designed for high current/high power performance testing. This system is suitable for performance evaluation, life cycle testing and product selection of large Lithium-ion Battery Cells (LIB Cells), Electric Double Layer Capacitors (EDLCs) and Lithium-ion Capacitors (LICs).

The 17010H's energy recovery circuit architecture offers a marked improvement over traditional switching power supply equipment. It features high measurement accuracy and precision, high-speed current response, zero-crossover time for charge/discharge conversion, as well as multiple current ranges. These characteristics enhance the accuracy of battery cell capacity tests, improve performance parameter validation, and facilitate realistic dynamic current and power testing. In addition, Chroma 17010H features a powerful 30-second 200% pulse current output function. For instance, a unit with a single-channel continuous current of 300A can produce a 30-second 600A pulse current. This provides a highly cost-effective and space-saving solution for applications such as power capability and DC internal resistance testing, which require short but high-rate test currents.

High-current life cycle tests highlight the importance of the test equipment's energy conversion efficiency. Benefits include not only reduced power demand, but also a large decrease in heat production. The control circuit operates at a relatively low temperature, effectively suppressing thermal drift and extending component life cycles. In this way, the 17010H achieves accurate and stable test performance. Compared with linear circuit products, it offers more efficient energy conversion and higher power density, reduces power distribution requirements for laboratories, saves operating power and air conditioning costs, and improves space utilization.

Designed with the diversity of battery cell products and experiments in mind, Chroma 17010H features channel paralleling with a continuous current up to 2400A and a pulse current up to 4800A. The performance of paralleled channels remains unchanged, with the exact same precision specifications and no response delay for optimal applicability.

For added safety, each channel is equipped with secondary voltage protection; an independent measurement circuit prevents battery overvoltage when a single component fails. The system's product maintenance design has also been improved: the circuit units are modularized and can be individually assembled and disassembled quickly, enabling convenient servicing and channel backup.

Ethernet CE

MODEL 17010H

KEY FEATURES

- High accuracy: ±0.01% of F.S.
- High precision: ±0.005% of F.S.
- 3 current ranges, up to 10:1 range span
- Fast current response<1ms
- Charge and discharge with zero crossover time
- Three-electrode fast charging boundary test
- 200% pulse current
- Channel parallel output up to 4800A
- Efficient recycling of discharged energy (75%)
- High speed data logging (1ms)
- High single point transient sampling rate (1ms)
- Level 2 V. Protection
- Integrable data logger and chamber
- Compliant with IEC and GB/T standards



Chroma
Advancing Excellence

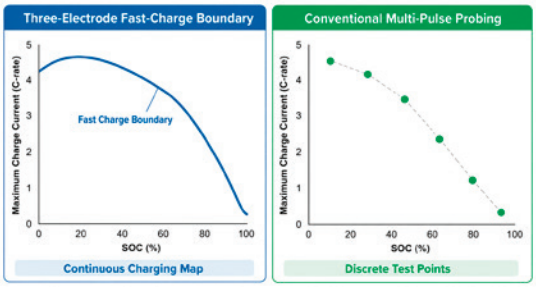
Features & Benefits - 17010H-6-300Hx Series

The 17010H-6-300Hx Series is designed for automotive battery modeling and fast-charging development. Utilizing a three-electrode measurement architecture and high-speed measurement capabilities, the unit simultaneously captures anode potential, transient voltage response, and charging boundary information. These data support battery model parameter identification, BMS algorithm validation, and research into fast-charging conditions.

Three-Electrode Fast Charging Boundary Test

Establishes SOC-specific fast-charging boundaries in a single test

Traditional three-electrode fast charging boundary testing requires running multiple sets of pulse charging tests at discrete SOC levels. At each level, the charging C-rate is incrementally increased until the anode potential approaches the lithium plating threshold. The individual SOC data points are then integrated to construct the fast charging boundary profile.



Comparison of Battery Cell Fast-Charging Boundary Exploration Methods

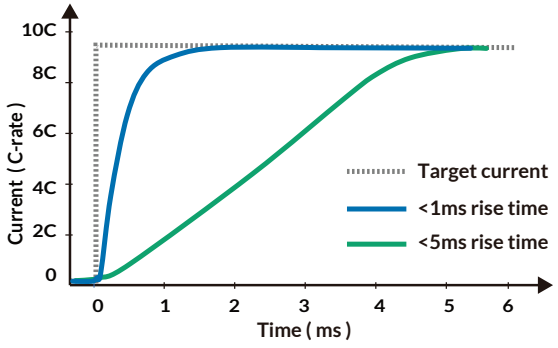
In contrast, the 17010H-6-300Hx dynamically controls the anode potential precisely at a designated lithium plating threshold while simultaneously measuring the maximum charging current across different SOC levels. This generates a continuous Charging Map, capturing the complete fast charging boundary data across the full SOC range within a single test run.

High Impedance & Low Potential Drift

Featuring an input impedance of greater than 10 GΩ, the system minimizes reference electrode polarization and measurement-induced lithium loss. This significantly reduces the impact of potential drift during long-term cycling tests.

<1ms Current Response Time

The <1ms current response enables rapid current step testing, delivering the precise excitation profiles required for high-fidelity model generation.

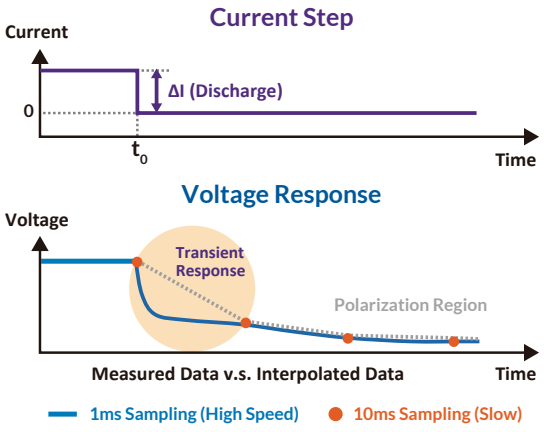


Current Response Impacts Drive-Cycle Fidelity

1ms High-Speed Data Logging

Battery modeling requires precisely capturing voltage variations within the battery's transient response. During HPPC, DCIR, and dynamic power testing, the voltage response at the exact moment of current switching contains vital model-related information, such as ohmic internal resistance (R_o) and polarization effects. If the sampling interval is longer than the transient timescale, critical phases of the voltage transition will not be directly measured.

With 1ms data logging, the system captures millisecond-level voltage dynamics, providing a reliable data source for model parameter identification and internal resistance analysis.



Logging Rate Impacts Critical Dynamic Data

±0.01% F.S. Voltage Measurement Accuracy

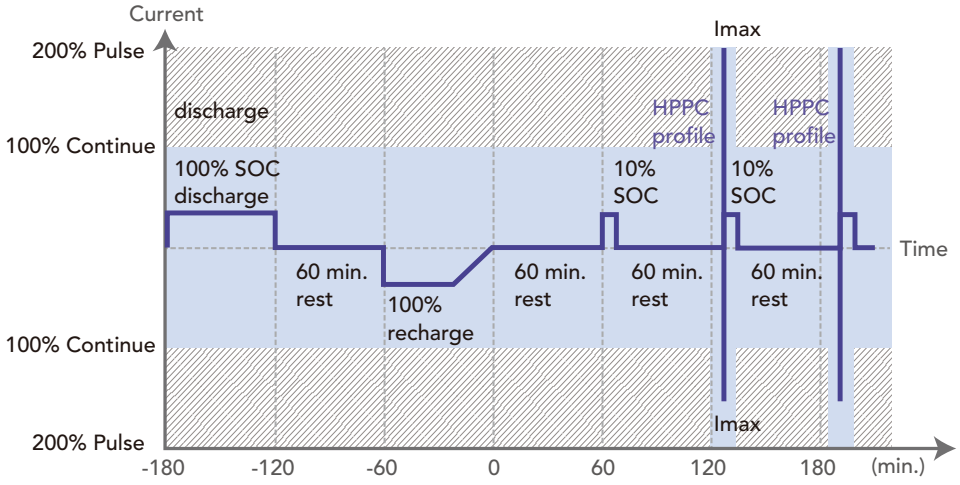
Life-cycle analysis and battery modeling require comparing capacity, internal resistance, and voltage variations across different cycling stages to track performance trends. When investigating aging behavior or degradation modes, variations in key cell characteristics can be as small as a few percentage points or less. The ±0.01% F.S. voltage measurement accuracy delivers the required precision for long-term cycling, degradation analysis, model validation, and measurement benchmarking.

Pulse Output High Current & High Power Function

■ Accurate output capability that meets test standards

Run power capability tests and driving simulations to test compliance of vehicle batteries with international standards. Test parameters for high-rate current and power are based on battery operating conditions (such as BEV, PHEV and HEV) with an output time of 30S, which makes purchasing full-power equipment unnecessary. Chroma 17010H not only provides up to 200% rated pulse current and power output capability, but can also effectively save equipment costs and space.



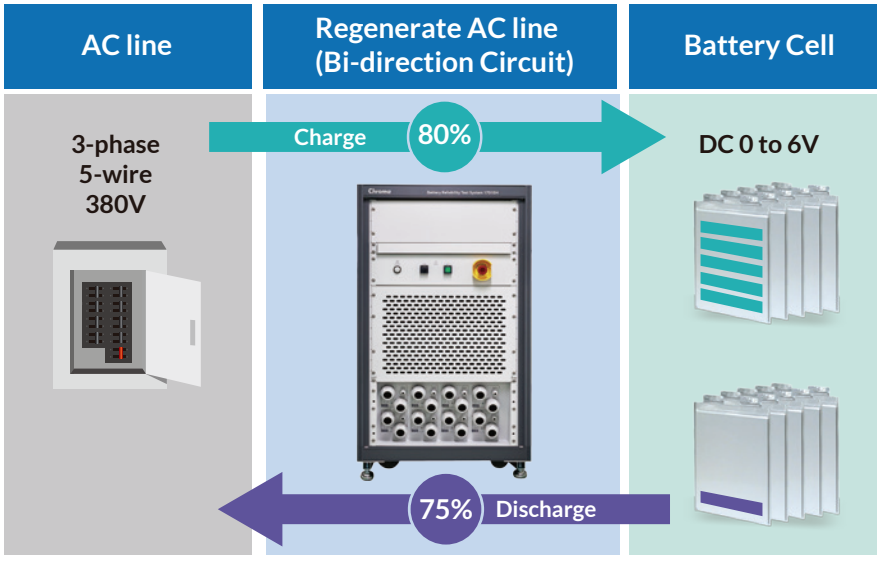


Energy Recovery Architecture

Chroma 17010H feeds the electric energy released during discharge back to the AC power grid, which greatly reduces the generation of waste heat, realizes green energy manufacturing with low carbon emissions, reduces power distribution requirements, and saves operating power and air conditioning costs.

■ Discharged energy is fed back to the regional power grid with a recovery rate of 75%

■ System feedback grid current's total harmonic distortion <5%

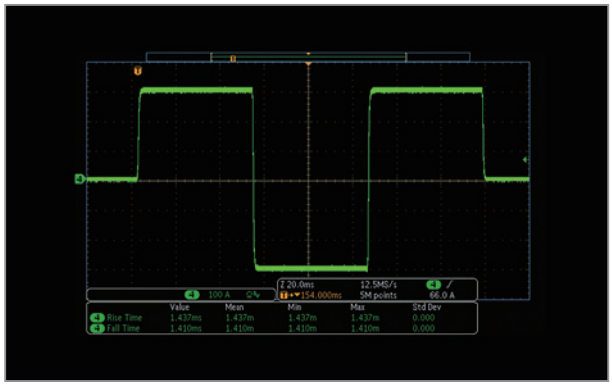


Energy Recovery Architecture

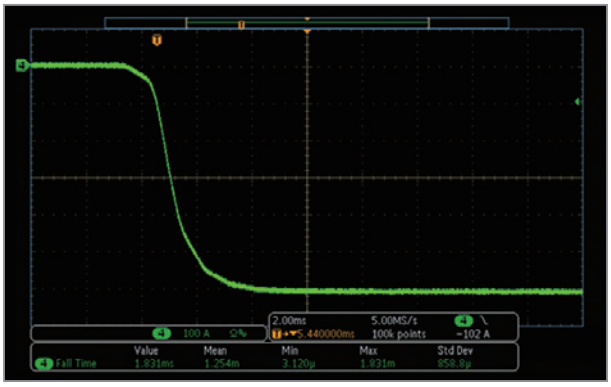
Fast Current Response Capability and Zero Crossover Time

- Fast current response<1.5ms / 200% pulse current output <2ms

The fast current response provides ideal experimental conditions, reduces cumulative errors during the fast-changing dynamic test and yields low-distortion data.



Rising time (10% to 90%): <1.5ms @30A to 270A
Switching time (+90% to -90%): <2ms @270A to -270A
Load: 5-meter cable short circuit



Rise time (-20% to -180%): <2ms @-60A to -540A
Load: 5-meter cable short circuit

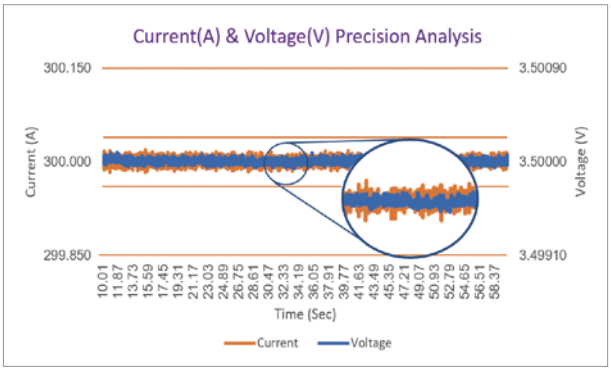
High Accuracy and High Precision

- Accuracy is key to comparison of different channel data

Battery products often require multi-channel experiments for comparative analysis. High accuracy ensures that the data's baseline deviation between different channels is minimal, making comparisons more objective.

- High precision improves data analysis efficiency

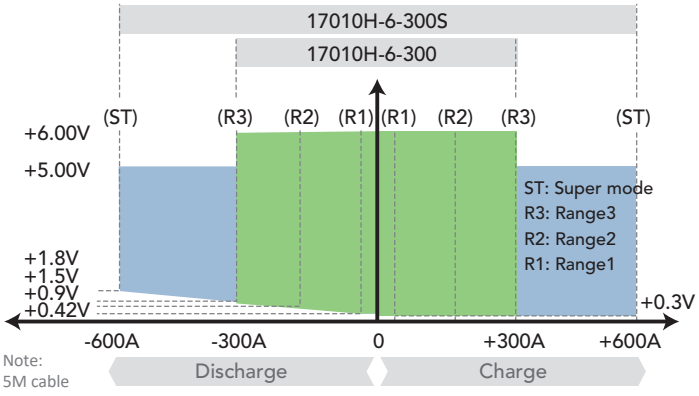
The inside of the battery is a complex electrochemical structure, and its characteristics are changed by the current, temperature, SOC, SOH and other experimental conditions. Initial changes are subtle and easily affected by the measurement stability of the equipment. High precision ensures measurement reproducibility and reduces measurement-caused data jumps, which is very helpful for the interpretation of the testing data.

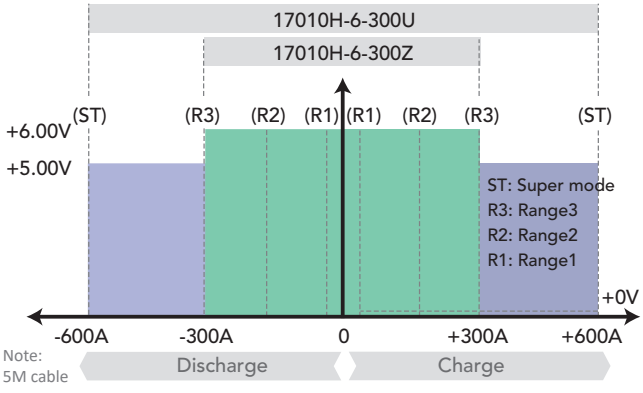


Precise measurement of voltage and current

0V Discharge

- Can perform battery cell 0V abuse test
- Suitable for EDLC testing

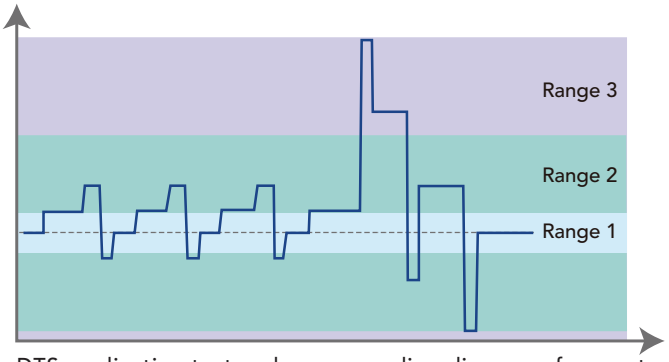




Multiple Current Range Design

■ Automatically selects suitable current range in constant current (CC) mode

Provides multiple current output and measurement ranges and is suitable for test plans covering both high current and small current



DTS application test and corresponding diagram of current range

High-Power Battery Testing Applications

The complete 17010H series supports channel paralleling, delivering a maximum parallel current of up to 2,400A. Even when paralleled, the system maintains the original channels' sampling rate, current response, and CP/CV control capabilities, making this series ideal for high-rate EV battery charging/discharging, power characteristic validation, and dynamic load testing.

Dynamic Waveform Loading

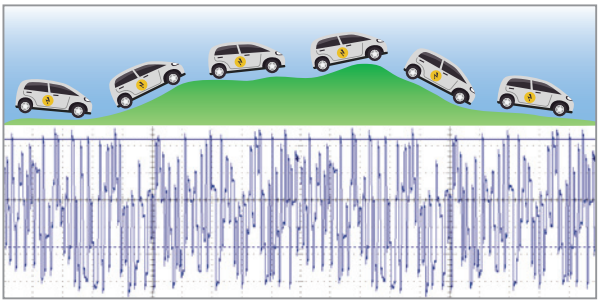
The Chroma 17010H goes beyond basic battery cycling by enabling preloading of dynamic charge/discharge waveforms. The system evaluates battery degradation modes and cycle life with enhanced realism by using dynamic current or power waveforms that closely mimic on-road charge/discharge conditions such as acceleration, deceleration, and uphill or downhill driving.

■ Supports dynamic and fixed time modes (min. output interval 10ms)

■ Loads up to 6,400,000 waveform data points within a single test plan

■ Dynamic Preloading Mechanism

Supports preloading subsequent drive-cycle data while the current test step is running, minimizing loading latency during step transitions. This feature is ideal for continuous dynamic profile testing, preventing unexpected rest periods during transitions that could compromise test conditions.



Dynamic Waveform Simulation

Dynamic Look-up Table (LUT) Function

Supports dynamic look-up table control using cell SOC and temperature as variables, automatically adjusting output conditions based on real-time cell operating states. Supported Output Modes:

■ Current Look-up Table: I = f(SOC, Temperature)

■ Voltage Look-up Table: V = f(SOC, Temperature)

Features both Step Look-up and Bilinear Interpolation modes, with support for Imax / Vmax boundary limit settings. This functionality is ideal for Battery Management System (BMS) control strategy validation, advanced fast-charging research, and environmental simulation testing.

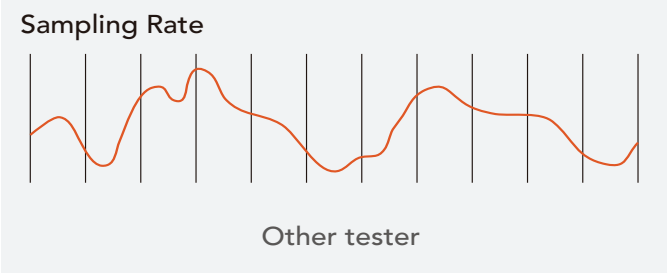
T / SOC	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	85%	90%	95%	100%
-20°C	9	26	26	26	17	17	17	17	17	17	17	17	9	9
-15°C	17	35	35	35	26	26	26	26	26	26	17	17	17	9
-10°C	26	57	57	57	35	35	35	35	35	35	35	26	17	9
-5°C	35	70	70	70	70	70	52	52	52	52	44	35	26	17
0°C	52	104	104	104	104	104	70	70	70	57	52	44	35	17
5°C	70	139	139	139	139	139	104	104	104	70	57	52	35	17
10°C	87	209	209	209	174	174	157	139	122	87	70	52	35	17
15°C	87	244	244	244	209	209	191	174	139	104	87	57	35	17
20°C	87	244	244	244	209	209	191	174	139	104	87	57	35	17
25°C	87	209	209	209	209	209	209	191	139	104	87	57	35	17
30°C	87	209	209	209	209	209	209	191	139	104	87	57	35	17
35°C	44	87	87	87	87	87	87	87	70	70	57	57	35	17
40°C	26	57	57	57	57	57	57	57	57	57	57	35	17	17
45°C	9	9	9	9	9	9	9	9	9	9	9	9	9	9

Dynamic Look-up Table

High-speed Sampling Technology

The Chroma 17010H uses high-speed voltage and current sampling with double-integration computing to accurately capture transient changes during testing without distortion. This approach provides highly reliable capacity calculations, eliminating the significant cumulative error seen with conventional test equipment that records key data at report sampling speeds.

- Hardware internal voltage/current sampling rate: 1ms
- Report single point transient sampling rate: 1ms
- Report sampling rate: 10ms



General Testers Charging/Discharging Sampling Rate

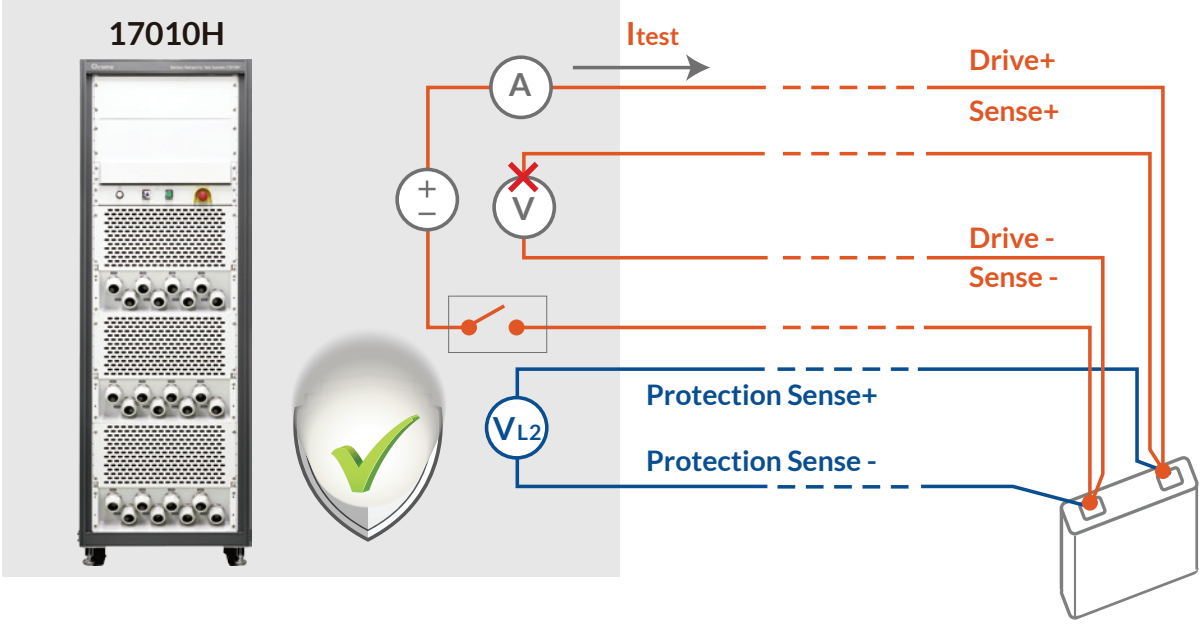


Chroma 17010H Charging/Discharging Sampling Rate

Independent Hardware Level 2 V. Protection

- Level 2 V. Protection reduces the risk of voltage measurement failure

  Accidents caused by large battery cells are unpredictable. In order to strengthen the safety of the experiment, an auxiliary voltage is independently set in each channel to protect the measurement circuit, which independently memorizes the protection parameters and operates autonomously. When an abnormality occurs, the output circuit is forcibly closed immediately.



Comprehensive Fault Tolerance: Ensures Continuous, Uninterrupted Long-Term Test Data

- Grid Failure Recovery (Optional UPS): In the event of a power outage, data is automatically cached to the IPC database. Once power is restored, the test automatically resumes from the breakpoint, ensuring complete and uninterrupted report data.
- Manual Recovery from Abnormalities: When a protection alarm is triggered, the channel pauses instantly. After the issue is resolved, users can manually recover and resume the original test workflow.
- Flexible Channel Transfer: Supports transferring a paused test to a different channel to resume from the breakpoint. This enables agile responses to "original channel failure" or "laboratory resource reallocation" scenarios.

System Integration and Protection

Chroma 17010H supports integration of environmental chambers of various well-known brands as well as multi-functional data loggers. With the Battery LEx software, you can set parameters and monitor data simultaneously. Test data is automatically compiled into test reports, all in all providing a fully comprehensive test solution.

Integrable data logger

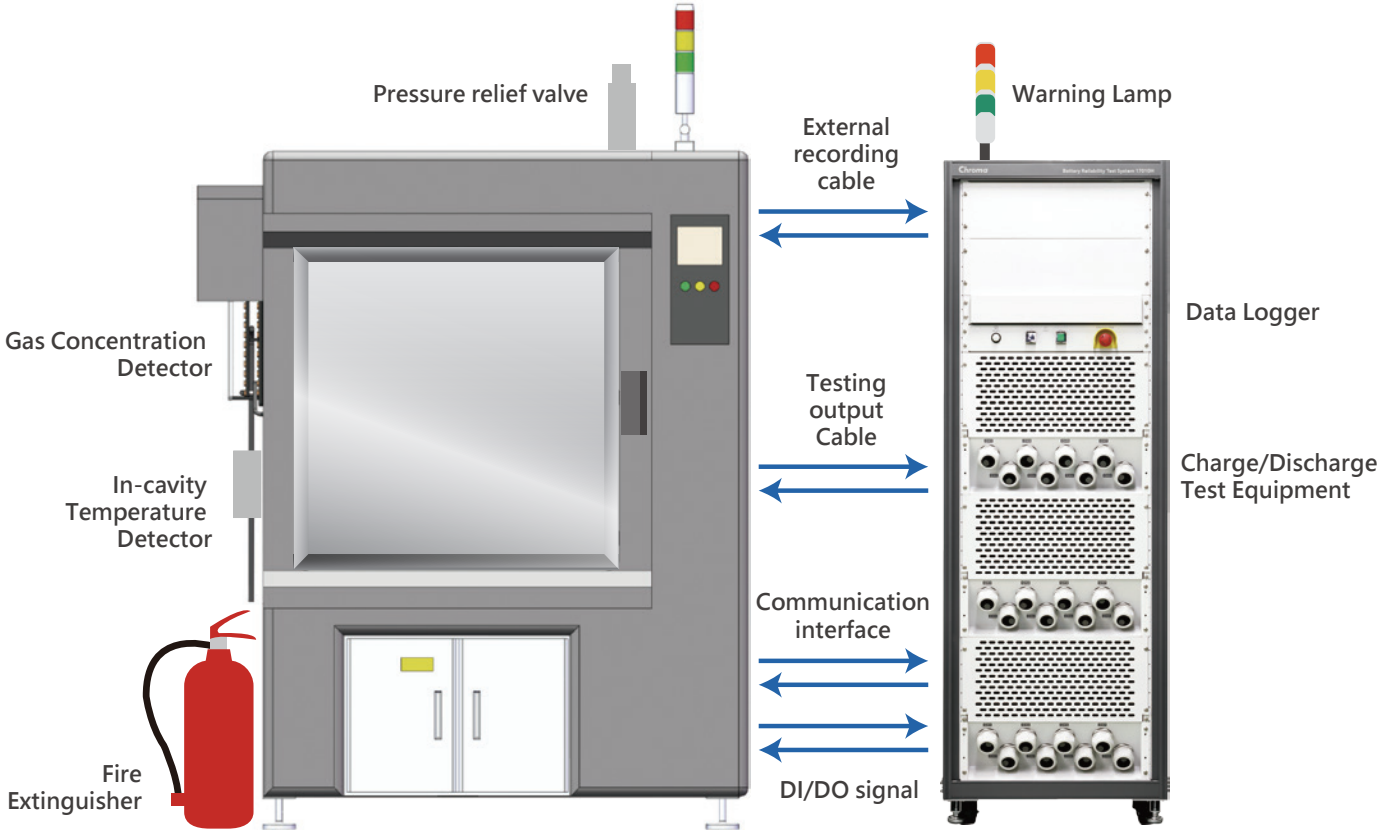
- Records temperature (°C), voltage (V), pressure (mPa), force (kg).
- Recorded real-time data can be used as judgment criterion for cut-off or temperature protection measures.

System protection and abnormality detection

- Test recipes include various built-in protections; the protection mechanism monitoring these has a response speed of 1ms when triggered. An optional external voltage/temperature meter relay can be added to provide reliable dual-layer protection.
- Real-time abnormality detection allows each individual unit to automatically detect abnormalities based on independent logic. When the system is interrupted, the test can be continued after the exception is cleared without data loss.

Chamber integration and peripheral safety engineering

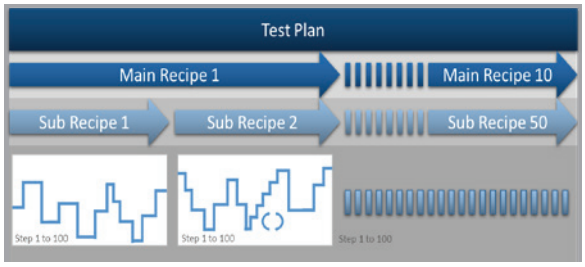
- The Battery LEx software provides built-in chamber setting control and control steps for temperature, humidity, timeout, and over-temperature protections while indicating temperature control time, delay time, and standby temperature.
- To ensure consistency of the test conditions, the grouping management structure allows all testing channels in the same chamber to enter the temperature control phase at the same time.
- The built-in DI/DO function can be connected to smoke/gas detection, a fire extinguisher, and alarms for over-temperature, over-voltage, and open door. The system performs different levels of handling according to the degree of damage, including stopping the test or powering off. Alarm data can be sent remotely via e-mail.



Battery LEx Software

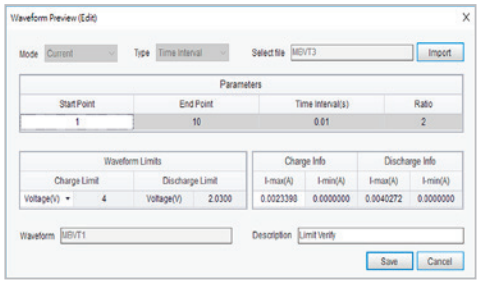
Battery Lab Expert (Battery LEx) is the testing software platform specially developed for Chroma 17010/17010H and offers:

- Group Testing: each group can control up to 96 channels and execute up to 50,000 steps.
- Variable editing: use data from the external data logger for flexible programming and complex applications
- Chamber integration: real-time monitoring of chamber status and protection mechanisms through DI/DO expansion.

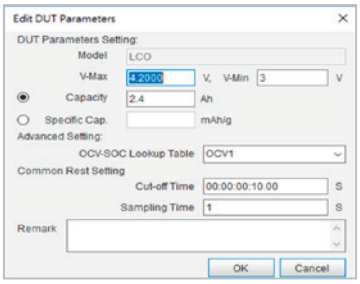


Project Browser

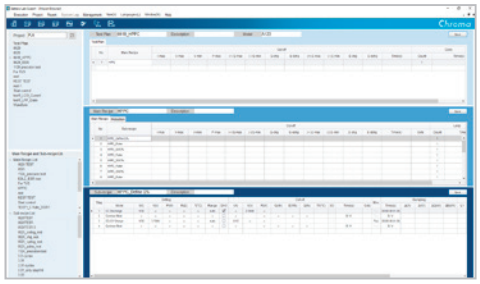
- Streamlined Management: Easily create and organize up to 500 test plans tailored to specific DUT types or test requirements.
- Intuitive Display and Real-time Editing: Effortlessly browse, inspect, and adjust test plans, DUT specifications, waveform simulation data, and recipe content. Modify parameters on the fly and save them instantly for maximum efficiency.
- DUT Database: establish a central repository for all your DUT specifications, allowing you to quickly map parameters during recipe editing. Use recipe sharing for efficient testing across different projects.
- Operation Simulation: import data points directly from xlsx files to simulate operating conditions. Define time intervals (both equal and custom), output multiplier, and data ranges to create highly realistic test scenarios.



Waveform Simulation Database



DUT Database

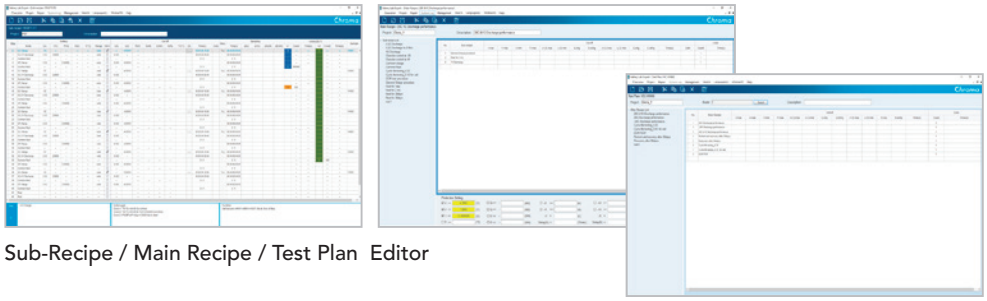


Project Browser

Recipe Editor

- Layered Structure: craft intricate test plans with a hierarchical structure including up to 50,000 steps (SR -> MR -> TP).
- Easy Creation: design new recipes from scratch to address a wide range of test applications.
- Quick Editing: combine existing recipes to rapidly build comprehensive test plans.
- Special Settings: utilize special settings for C-rate, OCV-SOC, Q%, ±V, and variables to create highly customized recipes.
- Variable Settings and Cutoff Conditions: Provides 30 customizable variables, including 12 global variables shareable across sub-recipes.

The 1-100ms transient capture function meticulously records transient changes at the start or end of each step, then defines them as variables for secondary calculation.



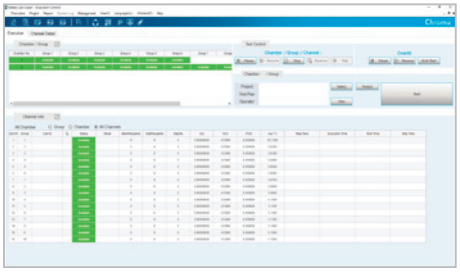
Sub-Recipe / Main Recipe / Test Plan Editor



Variable Definition and Transient Capture

Recipe Executor

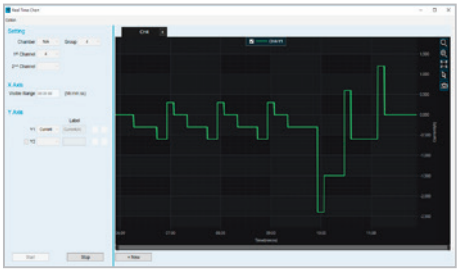
- Multi-channel group management
- Multi-group start
- Various Control Options: start, pause, resume, stop, scheduled pause, specified start, skip to next step, pause and skip to next step, recipe preview
- Real-time Test Status: real-time display of test data for individual channels and entire group
- Supports dynamic paralleling



Recipe Executor

Real-time Chart Display

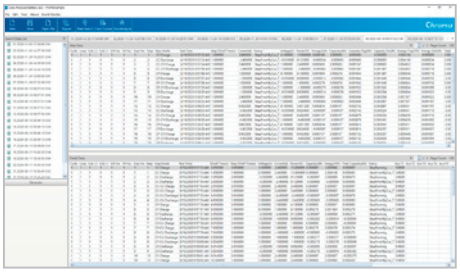
- Real-time Data Plotting: plots data in real-time based on the set sampling time, with up to 36,000 data points displayed on a single screen.
- Multi-chart Monitoring: view up to 4 independent graphs simultaneously, allowing for comparison of up to 2 test channels per graph.
- Graph Capture: use the time freeze function to capture and save test curves.
- Multi-axis Analysis: provides dual-Y-axis data display for more comprehensive analysis.



Real-time Chart Display

Test Report

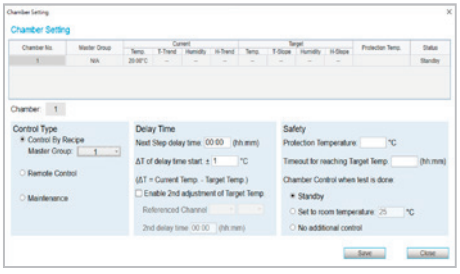
- Automatic Export: automatically exports to user-specified path based on defined export mode and filename.
- Export Modes: choose between manual export or automatic export based on either sub-recipes or time settings.
- Adjustable data precision up to 9 decimal places.
- Report Types: channel-level report, step-level report
- Customization: Freely adjust report items and column orders to tailor the report to your needs.



Test Report Preview

Chamber Control and System DI/DO Signal Control

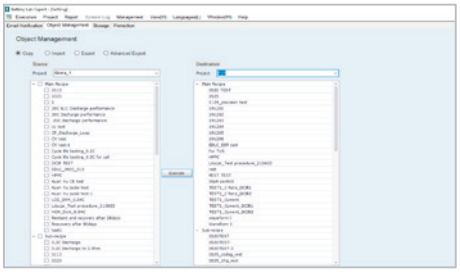
- Three Control Modes: chamber control steps, real-time remote control, maintenance mode.
- Delay Function: set a rest time after reaching the set temperature to ensure consistency between the temperatures of the chamber and the DUTs.
- Cycle Temperature Setting: paired with a data logger, the system can adjust the chamber temperature based on the actual DUT temperature to accurately ensure temperature consistency.
- End-of-test Setting Modes: end temperature control, adjust to the specified temperature, or maintain temperature.
- Dual Protection Control: over-temperature protection, temperature control timeout protection.
- External Device Control: provides three-color light signal control and relay signal control.
- Synchronized Temperature Control: automatic sync. mechanism ensures that the chamber temperature control starts only when all channels reach the "temperature control step", ensuring test consistency.
- Temperature Control Inheritance: automatically transfer chamber control to another group upon completion of the main group's test.



Chamber Control Settings

Management

- Account and Permission Management: establish multiple user accounts with passwords and assign corresponding editing permissions.
- Alert Notifications: set up email alerts for warning messages.
- Recipe Transfer: import/export/move recipes and test plans.
- Data Management: administrators can set up automatic or manual deletion of system data.

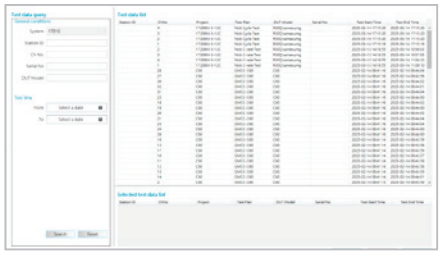


Test Plan Import/Export

- Forced Global Protection: set mandatory protection items for recipes to prevent human error and enhance test safety.

Real-Time Data Filtering and Chart Generation

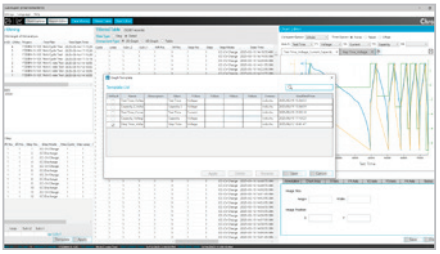
- Data Query: Quickly filter large volumes of test data using custom conditions to accelerate analysis workflows.
- Chart Drawing: Flexible chart and table visualization with various plot configuration options to meet diverse testing and presentation needs.
- Graph Template Function: Display default charts to reduce manual operations and speed up analysis.
- Data Analysis: Rapidly identify abnormal data, enabling decision-makers to respond to issues in real time.



Data query



Data filtering and charting



Graph Template

Data Integration and Chart Management

- Automated Multi-Channel Operation: Apply charts to multiple selected channels simultaneously to reduce repetitive tasks.
- Flexible Drawing Modes: Generate separate charts or merge data into a single chart to suit different application scenarios.
- Accurate Table Configuration: Various layout options are available for clearer data output.
- Smart Parameter Matching: Automatically checks data consistency to ensure accurate merging.
- Standardized Naming Format: Automatically appends labels to merged charts to enhance traceability.
- Flexible Data Arrangement: Supports both vertical and horizontal layouts to improve readability.

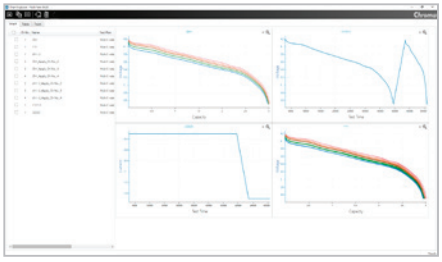
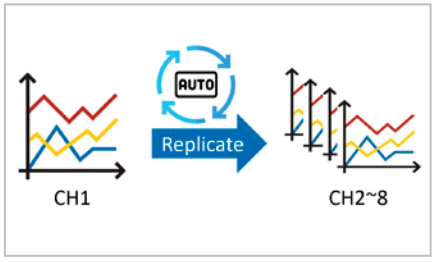
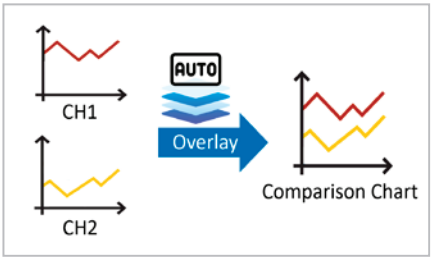


Chart Explorer



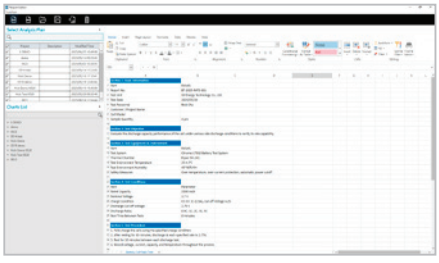
Replicate Function



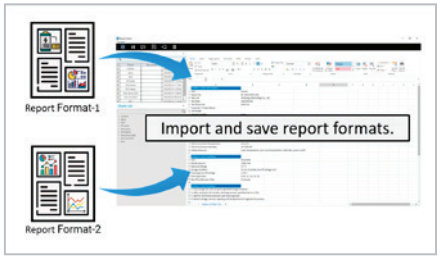
Graph Arrangement

Report Templates and Export

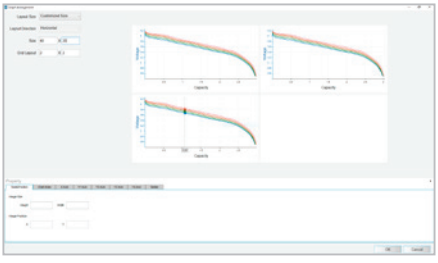
- Custom Report Template Function: Save frequently used formats to speed up report generation.
- Word-Processor-Like Interface: Create and export reports without relying on Microsoft Excel.
- Quick Insertion of Charts and Tables: Generate well-structured battery test reports with embedded visuals and data tables.



Report Editor



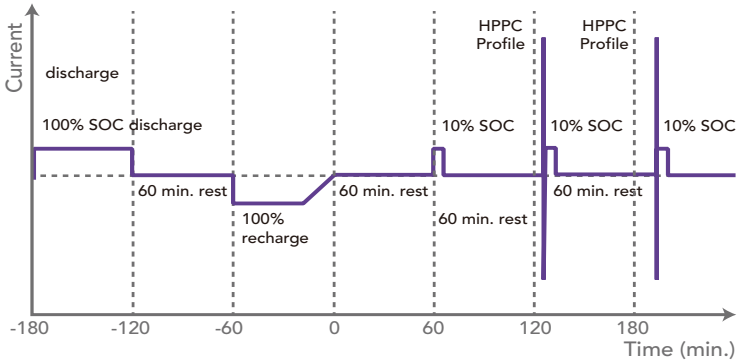
Replicate Function



Graph Arrangement

Hybrid Pulse Power Characteristic (HPPC)

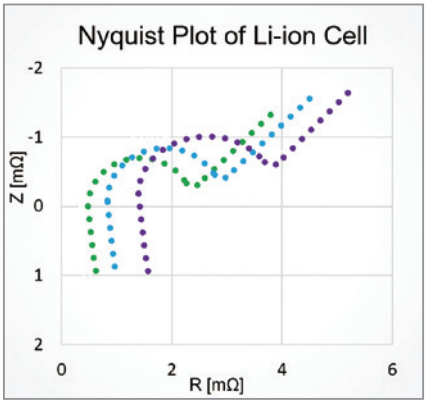
The Chroma 17010H features a flexible editing program that can compile HPPC test steps, as defined by the U.S. Council for Automotive Research (USCAR) for evaluation of EV battery performance. The purpose is to obtain the open circuit voltage, ohmic resistance (Ro), and polarization resistance (Rp) of a specific depth of discharge within the battery's operating voltage range using the specified test methods. It establishes a functional relationship between the depth of discharge and the charge/ discharge peak power, serving as an indicator for evaluating the battery cell's aging and output power capacity.



Hybrid Pulse Power Characteristic (HPPC)

One-Stop Electrochemical Impedance Spectroscopy (EIS) Testing Solution

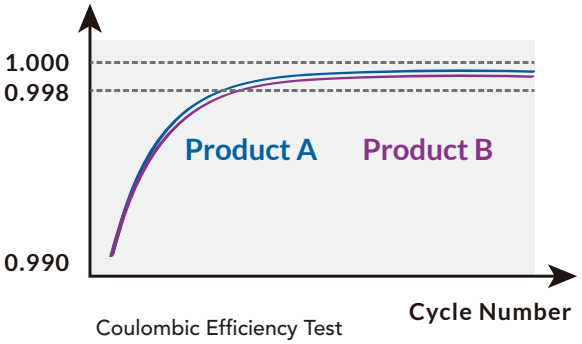
The optional EIS measurement function can be integrated into a one-stop testing system, enabling flexible programming for both DC cycling tests and impedance analysis. This significantly enhances experimental efficiency and data consistency. The system architecture allows for testing without transferring the battery, minimizing contact variation and temperature fluctuations - further ensuring data consistency and repeatability. It is ideal for a wide range of applications, including battery performance evaluation, model selection, life prediction, degradation analysis, and BMS modeling.



Nyquist Plot

Coulombic Efficiency (CE)

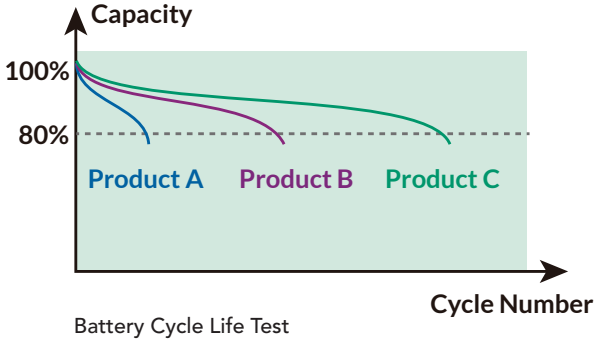
CE is calculated by fully charging and discharging the battery and then measuring the ratio of the total charge put into the battery. The Chroma 17010H's best-in-class precision and stability allow you to easily identify batteries with superior characteristics. Through accurate CE testing, battery life can be estimated using fewer cycles, saving time and resources in the evaluation process.



Coulombic Efficiency Test

Battery Cycle Life

Cycle life is one of the most important test items for batteries. Based on experimental objectives, this test subjects the battery through repeated charge and discharge conditions until the capacity falls to 80%, and then calculates the number of cycles. The cycle life test can be used to evaluate battery performance or define appropriate usage conditions.

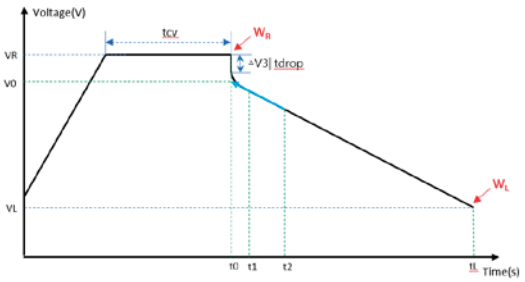


Battery Cycle Life Test

LIC End-of-Line and Durability Testing

With the rapid expansion of AI applications, the floating-point operations per second (FLOPS) of large language models (LLMs) are growing exponentially. The increasing power demand of high-density integrated AI GPUs used for training and inference presents a major challenge for data centers: how to reliably deliver peak power without interrupting GPU operation. To address this issue, capacitor energy storage systems (CESS) based on lithium-ion capacitors (LICs) are now commonly adopted as a backup power solution.

- IEC 62813 End-of-Line Testing Solution:
  The Chroma 17010/17010H systems are equipped with test sequences compliant with IEC 62813, allowing users to perform capacitance and DC internal resistance (DCIR) tests. This facilitates accurate classification and evaluation of DUTs.
- Support for LIC Durability Testing:
  To ensure LICs used in CESS can provide stable high-power output over extended periods, performance degradation testing is required during the selection process. The Chroma 17010H systems support cycle life and durability testing with low output noise and high measurement accuracy-delivering high-quality data for reliable LIC characterization.



$$Cap = \frac{2W}{V_0^2 - V_L^2} = \frac{2*(W_L - W_R)*3600}{(V_0^2 - V_L^2)} \qquad DCR = \frac{(V_R - V_0)}{I_{dch}}$$

Battery Cell Testing Data Loggers

The Multi-Channel Data Loggers Chroma A172013 (Voltage), A172014 (Temperature-Thermocouple Type), and A172015 (Temperature-Resistance Type) can serve as auxiliary channels for the 17010H system, providing real-time monitoring of DUT data during charge and discharge tests. This data can then be integrated into the test report via the Battery LEx software, where you can also set upper limit protections to ensure test safety.

- Each channel adopts independent 24-bit ADC sampling
- Equipped with cold junction compensation function
- Can be used as a standalone unit or connected to voltage or temperature modules, expandable up to 128 channels





Multi-Channel Voltage Data Logger A172013						
Channels	16					
Number of Modules Connected *1	Up to 8 pcs					
Interface	Ethernet					
Measurement Range	±10V	±5V	±1V	±0.5V	±100mV	±20mV
Accuracy *2	±0.015% of F.S.				±0.05% of F.S.	
Resolution	0.3mV	150μV	30μV	150μV	3μV	0.6μV
Max. Voltage to Ground	±300V					
Max. Voltage between Channels	±250Vdc					
Wire Connection	M3 screw					
Sampling Time *3	10ms					

A172015 Multi-Channel Temperature Data Logger (RTD)		
Channels	16	
Number of Modules Connected	Up to 8 pcs	
Interface	Ethernet	
Measurement Range	Range	Measure Range
	100°C	-100°C to 100°C
	500°C	-200°C to 500°C
	2000°C	-200°C to 800°C
Accuracy (23±5°C)	±0.05% f.s. ±0.5°C	
Resolution	0.04°C	
Terminal	European Terminal Block (PT100)	
Sampling Time *3	10ms	

Multi-Channel Temperature Data Logger A172014 (Thermocouple Type)		
Channels	16	
Number of Modules Connected *1	Up to 8 pcs	
Interface	Ethernet	
Measurement Range	Range	Measure Range
	K 100°C	-100°C to 100°C
	K 500°C	-200°C to 500°C
	K 2000°C	-200°C to 1350°C
	J 100°C	-100°C to 100°C
	J 500°C	-200°C to 500°C
	J 2000°C	-200°C to 1200°C
	T 100°C	-100°C to 100°C
	T 500°C	-200°C to 400°C
	T 2000°C	-200°C to 400°C
Accuracy *2	±0.05% of F.S. ±1°C	
Resolution	0.1°C	
Temperature Transducer	J, K, T type Thermocouple	
Wire Connection	M3 screw	
Sampling Time *3	10ms	

Note*1: A172013, A172014, and A172015 modules can be integrated and used simultaneously.
Note*2: The accuracy specification does not include errors caused by the testing cables, under the condition of 100ms sampling and 23±5°C .
Note*3: The sampling time is for the single unit specification and does not include data integration and transmission.

Integrated One-Stop EIS Testing Device

The Chroma Electrochemical Impedance Spectroscopy (EIS) Testing System integrates the Hioki customized BT4560-60 Battery Impedance Tester and SW1002 Scanning Module Rack, enabling users to perform DC tests and impedance analysis simultaneously. This integration helps accelerate battery performance evaluation.



EIS Testing Device Specification	
EIS Frequency Range	10kHz-10mHz
Impedance Measurement Accuracy	R: ± (0.4% |R| +0.52% |X|) ±4.5 μ Ω X: ± (0.4% |X| +0.52% |R|) ±4.5 μ Ω
Impedance Measurement Resolution	0.1μΩ

Battery Cell Test System Auto Calibrator

Chroma A170108 is a complete automated calibration and verification unit with a variety of high-precision calibration standard components built-in for programmable test tasks. The Auto Calibrator applies to Chroma 17010H products up to 600A in order to ensure that the equipment maintains its high precision and traceability.

- Consistent Standards Verification: minimizes human errors and variation in test results.
- Efficient Calibration and Verification: cuts down labor costs.
- Automated Report Generation: convenient management of maintenance records and traceability.



Specifications	
Voltage	0-10V
Current	20A/30A/60A/100A/200A/300A/600A (7 ranges)
Channel	1CH
Input	Single-phase AC 200V-240V ±10%
Dimensions (W x D x H) (mm)	600 x 900 x1100
Weight (Kg)	<215
Equipment	
Standard	A170108, A820001 S/W, IPC & Windows 11 & Office, RS-485 card, 7230 I/O card
Option	30ppm digital DMM, Monitor, Keyboard & mouse



17010H Operating Environment Specifications and Cabinet Dimensions		
Operating temperature		0°C-40°C
Operating humidity		<90 RH%
Input		3Φ 200-220Vac ± 10% V_{LL} 3Φ 380-400Vac ± 10% V_{LL} Frequency 47-63Hz
Dimensions (W x D x H) (mm)	25U (23")	700 x 1260 x 1340
	36U (23")	700 x 1260 x 1830
	42U (23")	700 x 1260 x 2100
Weight (Kg)	25U (23")	<450
	36U (23")	<510
	42U (23")	<640

Specifications - 1

Model		17010H						
Module		17010H-6-200		17010H-6-200Z		17010H-6-200S		17010H-6-200U
Voltage								
Accuracy		±0.015% of F.S.				±0.015% of F.S.		
Precision		±0.005% of F.S.				±0.005% of F.S.		
Range		Charge 0.3V-6V Discharge 1.5V-6V		Charge 0V-6V Discharge 0V-6V		Charge 0.3V-6V Discharge 1.5V-6V		Charge 0V-6V Discharge 0V-6V
Resolution	Output	0.1mV				0.1mV		
	Measurement	0.05mV				0.05mV		
Current								
Accuracy		± 0.05% of F.S.				± 0.05% of F.S.		
Precision		± 0.0125% of F.S.				± 0.0125% of F.S.		
Range		20A	100A	200A		20A	100A	200A	300A (ST) *1
Resolution	Output	0.5mA	2.5mA	5mA		0.5mA	2.5mA	5mA	10mA
	Measurement	0.25mA	1.25mA	2.5mA		0.25mA	1.25mA	2.5mA	5mA
Power								
Accuracy		±0.065% of F.S.				±0.065% of F.S.		
Precision		±0.0175% of F.S.				±0.0175% of F.S.		
Range		120W	600W	1200W		120W	600W	1200W	1500W (ST) *1
Resolution	Output	2.5mW	12.5mW	25mW		2.5mW	12.5mW	25mW	50mW
	Measurement	1.25mW	6.5mW	12.5mW		1.25mW	6.5mW	12.5mW	25mW
		1-24				1-24			
Sampling Time		10ms				10ms			
Current Rise Time (+10%~+90%)		<1.5ms				<1.5ms			<2ms
Energy Recovery Efficiency		75%				75%			
Auxiliary Voltage Protection Channel		Configure one per channel				Configure one per channel			

Module		17010H-6-300		17010H-6-300Z		17010H-6-300S		17010H-6-300U
Voltage								
Accuracy		±0.015% of F.S.				±0.015% of F.S.		
Precision		±0.005% of F.S.				±0.005% of F.S.		
Range		Charge 0.3V-6V Discharge 1.5V-6V		Charge 0V-6V Discharge 0V-6V		Charge 0.3V-6V Discharge 1.5V-6V		Charge 0V-6V Discharge 0V-6V
Resolution	Output	0.1mV				0.1mV		
	Measurement	0.05mV				0.05mV		
Current								
Accuracy		± 0.05% of F.S.				± 0.05% of F.S.		
Precision		± 0.0125% of F.S.				± 0.0125% of F.S.		
Range		30A	150A	300A		30A	150A	300A	600A (ST) *1
Resolution	Output	1mA	5mA	10mA		1mA	5mA	10mA	20mA
	Measurement	0.5mA	2.5mA	5mA		0.5mA	2.5mA	5mA	10mA
Power								
Accuracy		±0.065% of F.S.				±0.065% of F.S.		
Precision		±0.0175% of F.S.				±0.0175% of F.S.		
Range		180W	900W	1800W		180W	900W	1800W	3000W (ST) *1
Resolution	Output	5mW	25mW	50mW		5mW	25mW	50mW	100mW
	Measurement	2.5mW	12.5mW	25mW		2.5mW	12.5mW	25mW	50mW
Sampling Time		10ms				10ms			
Current Rise Time (+10%~+90%)		<1.5ms				<1.5ms			<2ms
Energy Recovery Efficiency		75%				75%			
Auxiliary Voltage Protection Channel		Configure one per channel				Configure one per channel			

Note *1: The ST range is super output mode (Super Mode), with a voltage range of 1.8V to 5V.
*All specifications are subject to change without notice.

Specifications - 2

Model		17010H						
Module		17010H-6-300H		17010H-6-300HZ		17010H-6-300HS		17010H-6-300HU
Voltage								
Accuracy		±0.01% of F.S.				±0.01% of F.S.		
Precision		±0.005% of F.S.				±0.005% of F.S.		
Range		Charge 0.3V-6V Discharge1.5V-6V		Charge 0V-6V Discharge 0V-6V		Charge 0.3V-6V Discharge 1.5V-6V		Charge 0V-6V Discharge 0V-6V
Resolution	Output	0.1mV				0.1mV		
	Measurement	0.05mV				0.05mV		
Current								
Accuracy		± 0.015% of F.S.				± 0.015% of F.S.		
Precision		± 0.0075% of F.S.				± 0.0075% of F.S.		
Range		30A	100A	300A		30A	100A	300A	600A (ST) *1
Resolution	Output	1mA	5mA	10mA		1mA	5mA	10mA	20mA
	Measurement	0.5mA	2.5mA	5mA		0.5mA	2.5mA	5mA	10mA
Power								
Accuracy		±0.025% of F.S.				±0.025% of F.S.		
Precision		±0.0125% of F.S.				±0.0125% of F.S.		
Range		180W	600W	1800W		180W	600W	1800W	3000W (ST) *1
Resolution	Output	5mW	25mW	50mW		5mW	25mW	50mW	100mW
	Measurement	2.5mW	12.5mW	25mW		2.5mW	12.5mW	25mW	50mW
Channel / Rack		1-16				1-16		
Minimum Sampling Interval *2		1ms/10ms				1ms/10ms		
Current Rise Time (+10% to +90%)		<1ms				<1ms		
Regenerative Efficiency		75%				75%		
Three-electrode anode potential measurement								
Range		±6V						
Accuracy		± 0.01% of F.S.						
Precision		± 0.005% of F.S.						
Resolution		0.05mV						

Note *1 The ST position represents Super Mode (Super Output Mode), featuring an ST voltage range of 1.8V to 5V.
Note *2 Supports 1ms high-speed sampling at step initiation (up to 60 s max) to capture transient current characteristics, before automatically switching to the configured baseline sampling rate for long-term logging.
* Specifications are subject to change without notice.

ORDERING INFORMATION

System	17010H						
Model	Current Range	Voltage Range	Super Mode	0V Discharge	Regenerative Mode	Channels	Rack
17010H-6-200	200A / 100A / 20A	0-6V	--	--	Yes	8 / 16 / 24	23" Rack (25U) (36U) (42U)
17010H-6-200Z	200A / 100A / 20A	0-6V	--	Yes	Yes	8 / 16 / 24	
17010H-6-200S	200A / 100A / 20A	0-6V	Yes	--	Yes	8 / 16 / 24	
17010H-6-200U	200A / 100A / 20A	0-6V	Yes	Yes	Yes	8 / 16 / 24	
17010H-6-300	300A / 150A / 30A	0-6V	--	--	Yes	8 / 16	
17010H-6-300Z	300A / 150A / 30A	0-6V	--	Yes	Yes	8 / 16	
17010H-6-300S	300A / 150A / 30A	0-6V	Yes	--	Yes	8 / 16	
17010H-6-300U	300A / 150A / 30A	0-6V	Yes	Yes	Yes	8 / 16	
17010H-6-300H	300A / 100A / 30A	0-6V	--	--	Yes	8 / 16	
17010H-6-300HZ	300A / 100A / 30A	0-6V	--	Yes	Yes	8 / 16	
17010H-6-300HS	300A / 100A / 30A	0-6V	Yes	--	Yes	8 / 16	
17010H-6-300HU	300A / 100A / 30A	0-6V	Yes	Yes	Yes	8 / 16	

Options		
Model	Items	Channels
A172013	Multi-Channel Voltage Data Logger	16 / 32 / 48 / 64 / 80 / 96 / 112 / 128
A172014	Multi-Channel Temperature Data Logger (Thermocouple Type)	16 / 32 / 48 / 64 / 80 / 96 / 112 / 128
A172015	Multi-Channel Temperature Data Logger (RTD type_PT100	16 / 32 / 48 / 64 / 80 / 96 / 112 / 128
A170108	Battery Cell Test System Auto Calibrator	1
BT4560-60	Hioki Battery Impedance Meter	1

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